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the above materials, is accomplished in the circulation, and not in the tissues; that it is chiefly produced in the arterial system, and commences from the moment oxygen is received in the lungs, such action continuing throughout its whole extent; that such action takes place also in the veins, but to a much less degree; that the heat necessary to maintain muscular and other tissues at the normal temperature is derived from the arterial blood passing through them, and not from any oxidation taking place in their proper tissues; and that such temperature of individual parts bears a direct ratio to the diameter, or sum of the diameters, of such arteries.

The means by which the materials, derived from the three separate sources alluded to above gain access to the circulation, I shall consider under three separate heads:—

First. Ingested fatty foods are delivered into the circulation through the thoracic duct, before reaching the termination of which they have much diminished, the white nucleated cells having absorbed them to a corresponding extent, carrying them into the circulation in an altered condition.

Second. For the removal of the *debris* of the tissues—such as active muscular tissue, &c., into the circulation—I attribute to the white cells in the capillaries (whose office has been a rather fertile source of speculation), the fulfilment of that important function.

Third. Such calorific materials as exist free in the circulation, whether derived from the ingested food, or stored up adipose tissue—as when the system is labouring under a deficiency of food—the white nucleated cells absorb them into their interior for calorifying purposes.

In fulfilling this secretive function they are converted into the fully formed red cells of the blood, which thereby become the active calorifying agents of the system—the laboratories, in fact, within which oxidation is rapidly effected, producing as a result carbonic acid, water, and various eliminative compounds, and the evolution of Animal Heat.

A portion of the oxygen of the red cell substitutes the iron of the hematine; the iron thus set free acts as the exciting or catalytic cause of union between the remaining free oxygen and such elements of the blood cell as, by oxidation, produce Animal Heat.

XV.—ON THE ORIGIN OF THE SOUTH EUROPEAN PLANTS FOUND GROWING IN THE WEST AND SOUTH OF IRELAND. By PROFESSOR HENNESSY, F. R. S. [Abstract.]

[Read May 27, 1867.]

THE author accounted for the circumstance that he brought this subject under the notice of the Academy by the fact, that although he had no pretensions as a botanist, his inquiries regarding the climatology of the

British Islands, and of Ireland especially, had induced him to examine into the influence exercised by climate on vital phenomena. In 1860* he had already called attention to the relations between the peculiar distribution of the Flora in the western districts of Ireland and the position of the isothermal lines in the Map which he had previously published.† These relations have been pointed out more recently, and with more precision, in the Map appended to a paper by Dr. David Moore, and Mr. A. G. More, "On the Climate, Flora, and Crops of Ireland," in the Report of the International Horticultural Exhibition and Botanical Congress, held in London, during May, 1866. The author briefly presented geological and geographical grounds for rejecting the hypothesis of the late eminent naturalist, Professor E. Forbes, and he also adduced similar criticisms from other inquirers.‡

The author next presented a summary of all the South European Plants found in the West and South-West of Ireland, specifying minutely their localities both in Ireland and on the Continent. The former are limited to two districts of comparatively moderate extent—namely, first among the western baronies of the counties of Galway and Mayo; and, secondly, the greater part of Kerry, together with the South-Western extremity of Cork. The nearest part of the Continent where the plants in question are found is, as already remarked by Forbes, the northern part of Spain, and especially the province of Asturias. The author calls these Plants, for brevity, the Asturian Flora; and the two districts where they are found in Ireland, the West Asturian and South-West Asturian districts, respectively. It has been admitted by Forbes, that there does not seem to be evidence of any local assemblage of animals in these districts corresponding to the Asturian Flora, and the inquiry is therefore entirely limited to discover the origin of the Plants. The physical conditions accompanying the growth of the Asturian Flora, both in Spain and in Ireland, are fully discussed. The climate of the province of Asturias is characterized by great moisture and a mild winter temperature; thus, at Oviedo, which is about the centre of the province, the mean annual fall of rain is nearly 75 inches, and the wettest months are April and May. The mean annual temperature is 55°.4 F.; the mean winter temperature, from 45°.4; the mean summer temperature is 65°.2; the mean yearly maximum is 88°, the mean yearly minimum from 31° to 34°.

The prevalent geological formations are stated to be Devonian and Silurian, and the soil is said to be generally retentive of moisture. Although the geology of the other provinces in the North of Spain is in some respects essentially different, there are good grounds for believing

* "Transactions of the National Association for Promoting Social Science," 1860, p. 733.

† "Atlantis," vol. i., p. 396.

‡ See "D'Archiac Hist. des Progres de la Geologie, publiée par la Société Geologique de France sous les Auspices du Ministre de l'Instruction publique," vol. ii., pp. 128-137; also Darwin's "Origin of Species," p. 354.

that their climate is similar to that of the Asturias. When we turn to the Asturian districts of Ireland, we find more features of geological and physical resemblance to the North of Spain than in any other districts of equal area in Ireland. The influence of climate, which seems of paramount importance in relation to Plants, is very remarkable in the Irish Asturian districts. The author illustrated his views by reference to a Map on which were projected the isothermal lines of mean annual and mean winter temperature for Ireland. These lines were drawn by the aid of observations made at some new stations, in addition to those on which he had to rely when projecting the isothermals already published. Among these stations he especially referred to Galway, from its position in the West Asturian district. From the Map, it appears that the greater part of the areas of both of the Asturian districts lie between the annual isothermals of 52° and 51° , and between the winter isothermals of 45° and 44° . These are the lines of highest temperature in Ireland, and the winter lines correspond almost identically with those belonging to the middle of the province of Asturias itself. On the other hand, the summer temperature of the Irish Asturian districts is from $57^{\circ}.5$ to $59^{\circ}.3$ respectively, and therefore from 6° to 8° lower than that of the North of Spain; whence it follows, that, if Plants were introduced into an Asturian district from Spain, some of which required a warm summer, while others required only a mild winter, the former would die, while the latter might survive, and even spread over extensive areas. The condition of great summer warmth seems to be especially required for annuals belonging to southern climes, as the ripening of the seeds would be inevitably checked by a single cold and wet summer. The growth of perennials appears to depend principally on the condition of winter temperature, as these Plants may spread by roots and suckers. After referring to the generally admitted fact of the moisture of the climate of Ireland, the author concludes, from observations made at Galway, Innishgort, in Clew Bay, and Lough Corrib, that the annual rainfall in the West Asturian district must at least exceed fifty inches; while observations made at Valentia, Killarney, Cahirciveen, and Castletownsend show that the fall is probably still greater in the South-West district.

Corresponding conditions exist with regard to the relative humidity of the air. If, as before supposed, different varieties of Plants from a southern clime were by accident introduced into our Asturian districts, for some of which moisture was more favourable than to others, the former would have a far greater chance of becoming widely spread, while the growth of the latter might be checked instead of being promoted.

The influence of cultivation in promoting or checking the introduction of wild Plants into the Asturian districts was next discussed. It appears from returns furnished to the Registrar-General of Ireland during five years, that the greatest proportion of weedy ground was observed in the Asturian districts; and from returns made during several years of the relative areas under tillage, pasturage, and in a totally un-

cultivated condition, that the Asturian districts were the lowest in general cultivation among districts of equal extent.

Although annuals and the class of weeds generally accompanying crops are at first favoured by culture, which opens the soil for their propagation, it seems that the tranquil development of perennial wild Plants takes place most completely where culture is imperfect, or entirely suspended : whence it follows, that, if any perennial wild Plants suited by their habits to the Asturian district happened to be introduced into them, their chance of existing and spreading would be greater than in other districts of Ireland. In addition to the evidence furnished by the returns of the Registrar-General, the author referred to the writings of Arthur Young, and to the Agricultural Surveys of the Counties of Ireland, in order to show that the same relative condition of the Asturian districts with reference to cultivation had been in existence as long as the subject had attracted any notice. It was shown by numerous references, that a great many well-authenticated instances of the introduction of Plants through commercial and general intercourse have greatly changed the Flora of different countries. These changes were often effected within a comparatively short period of time, and they were more or less complete in proportion to the more or less favourableness of the climatic condition of the new stations of the introduced Plants. After fully discussing these results, the author puts forward his views in the following propositions :—

During two periods of prolonged and intimate intercourse between the northern coast of Spain and the whole of Ireland, the conditions for bringing the seeds of various Plants into the latter country from the former probably existed ; and during the more recent of these periods, the existence of such trading and fishing intercourse between Spain and the Asturian districts of Ireland is so well established, and was of such a kind as to render the introduction of accidental seeds almost certain. Such seeds as required a warmer climate than that of Ireland for their germination necessarily failed, while those which were suited to the physical conditions into which they were thrown became naturalized. The winter isothermals, and the corresponding distribution of minimum temperature, confined the range of these Plants to the two narrow littoral districts where they are found. The cold and wet summers which often exist in Ireland would speedily destroy such annuals as happened to be introduced from the warmer summer climate of the North of Spain ; but a few of the perennials might still continue to exist, owing to the favourable conditions of winter temperature in the West of Ireland.

The author briefly discussed the grounds which we possess for believing in a former intercourse between Spain and Ireland at a very remote epoch ; and he examines, with great minuteness and detail, the evidence of such intercourse during a more modern period. It appears that from the thirteenth to the sixteenth centuries, inclusive, the West and South-West of Ireland were in close communication with the ports of Biscay and the Asturias. Local histories and traditions, popular poetry, and unpublished documents were referred to in support of this

conclusion; and it appears that many of the stations of the Asturian Flora, where plants are actually found, were also trading or fishing stations of Asturian or Biscayan mariners. It is also remarkable, that one of the Plants of the Asturian Flora has been observed in other parts of Northern Europe—namely, Belgium and the islands off the coast of Friesland, districts where the Spaniards had considerable intercourse before the Netherlands had finally achieved their independence. The winter climate of the Netherlands was probably not sufficiently favourable to the development of the other Plants belonging to the Asturian Flora, and these are therefore confined only to those parts of Ireland where all the physical and social causes favouring their growth have long existed in a sufficiently high degree of intensity.

XVI.—NOTE ON THE IRISH GLOSSES RECENTLY FOUND IN THE LIBRARY OF NANCY. BY HENRI GAIDOU.

[Read June 10, 1867.]

THERE have been recently found some old-Irish Glosses, written on the inside of the cover of a Manuscript, in the Library of Nancy. M. D'Arbois de Jubainville, the scholar by whom they were discovered, has published them in the "Bibliothèque de l'Ecole des Chartes," of June, 1866. This eminent French palæographer considers that they are of the ninth century. It is impossible to say from what volume was taken so small a piece of parchment, which was judged of so little importance as to be used in the binding of another manuscript. We may suppose, however, that this leaf came either from Luxeuil in the Vosges, or from one of the numerous monasteries to which religion and learning were brought from the Isle of the Saints.

These Glosses, unfortunately few in number, belong to a treatise on the *computus* (i. e., Chronological Rules—*vid.* Ducange). M. D'Arbois de Jubainville has only printed them. I shall try to translate them as far as I am able.

The first is: *dotōs cidlæ sæcht forā mbi Kl̄. Jāñ*. *Dotōs* is certainly an abbreviation for *dotoscelad̄*, which was found in a similar formula by Zeuss: *dothoscelad̄ áis ésci bis for kl. cach mis* ("Grammatica Celtica," p. 1074). I assume this *toscelad̄* to be the same as the modern *taisceallad̄*. *Cid* is the interrogative pronoun, of which many instances are given by Zeuss (p. 361). *Læ* is an old nominative of *la*, day. According to Pictet, this word is found in none of the Indo-European languages, with the exception of the Laghmani language of Cabul, which furnishes us with *laé*, day ("Origines Indo-Europæennes," II. p. 588, *n.*) I suppose that in the MS. there was a stroke on the *t* of *sæcht*, as on the *secht̄* of the fifth gloss. It is for *sæchtmaine* or *sechtmaine* (cf. Zeuss, p. 280.) *Sechtmaine* is, according to Ebel ("Beitraege zur vergleichenden Sprachforschung," IV., p. 378), the genitive of an